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AN
ESSAY
ON
BRITISH ISINGLASS:

Wherein its
NATURE and PROPERTIES
Are compared with the
FOREIGN SORTS;
WITH
The beſt METHODS of converting them into
FINING, GLUE and STARCH,
For the Uſe of the
BREWER, VINTNER, PAPER-STAINER, &c.
COMPREHENDING
A ſuccinct Analyſis of ISINGLASS, and Rationale of its Action in clarifying Liquors.

Interſperſed with Hints for the further Improvement of MALTING, BREWING, FERMENTING, and for preventing the Wooden Apparatus in the Brewery from ſpeedy Decay.

------*Potius ipſi laborandum, ut veram Relationem & Proportionem illorum ad ſuum Scopum & inde Tractationis Modum, ſive per Reſolutionem, ſive Tranſpoſitionem cognoſcat.*
STAHL. FUNDAM. CHEMIÆ.

By H. JACKSON.

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PREFACE.

THE principal Subject of the following Sheets may, perhaps, be deemed too trivial by ſome Perſons to deſerve a ſerious Examination; but as the Art of making Iſinglaſs in *England*, from *Britiſh* Materials, after a moſt rigid Scrutiny into its Merits, has been adjudged a new and uſeful Invention, by a very PATRIOTIC SOCIETY; and further confirmed as ſuch by the Diſcontinuance of a public Premium for effecting ſuch Diſcovery; the Neceſſity of explaining its Nature and Properties will not appear quite incongruous, eſpecially,

when

when it is conſidered to differ in ſome reſpects from the foreign Sorts, which being generally miſunderſtood by the Conſumers, has occaſioned a little Perplexity in its Management, and which it is hoped will be remedied, in future, by the preſent Eſſay.

WHERE different Intereſts of Individuals claſh, a Jealouſy of each other's Succeſs naturally reſults; hence, amongſt the Competitors in Importation, where foreign Iſinglaſs has long been eſteemed a lucrative Branch of Commerce, many Attempts have been made to cruſh the new Manufacture in its Infancy, and few Aſperſions ſilenced, which might tend to depreciate the Product, and reproach my Conduct in the Execution of the Buſineſs. I doubt not, but a little Time will exculpate me from ſuch Indignities; yet, at preſent,

ſent, I think it indiſpenſible to aver, that nothing practicable on my Part has been omitted, with reſpect to improving the Art, or procuring a Quantity ſufficient to leſſen the exorbitant Price of foreign Iſinglaſs; which laſt, has in great Meaſure been evidently effected; ſince, it is notorious, that the inferior Sorts have been reduced in Price full *Two hundred per Cent.* ſince the Commencement of the *Britiſh* Manufacture; and I am not dubious of convincing my Opponents, that nothing but a real Eſtabliſhment of our own, can poſſibly regulate the foreign Markets; ſince it is now no longer a Secret, that all the fine pellucid Sorts of Iſinglaſs, are conſumed in the Art of making *Mock Oriental Pearl Necklaces*, *Ear Rings*, and other Trinkets, but more particularly in ſtiffening *Linens*, *Silks*, *Gauſes*, and ſimilar Fabrics; on this Account, it is ſome Satisfaction to be aſſured, from late Experience, that the Produce of our own Colonies promiſes fair to ſupercede, at leaſt, all the *ordinary Sorts* of foreign Iſinglaſs; and the late Permiſſion to import the Materials *Duty Free*, has determined me to puſh the Buſineſs to its utmoſt Latitude, regardleſs of future Calumny and Malevolence, which have been obſerved, finally, to hurt none ſo much as their Abettors.

As the Conſumption of Beer depends greatly upon its Tranſparency (the Fœculencies being rightly adjudged unwholeſome) a free Enquiry into the Merits of each Species of Iſinglaſs, with the moſt advantageous Methods of converting them into Fining, and its real Mode of Action in clarifying

Malt Liquors, hitherto miſapprehended, it is preſumed, will not prove unacceptable to the Brewer and Victualler; partly, with this View, I ſome Time ſince recommended a Machine, improved from that lately introduced into the Laundry, for expediting the Waſhing of Linen, which anſwered extremely well in the ſmall Way, but was found inconvenient where Quantity and Diſpatch were required; this Objection, however, will be found ſufficiently obviated by the preſent Contrivance.

OBSERVATION has long convinced me, that a general Ignorance of the Properties of Iſinglaſs, and the Conceits of Servants, have occaſioned great Waſte and Difficulties in its Diſſolution into Fining: Indeed, a Reformation of the daily Abuſes committed by them may with more Propriety be wiſhed for than expected; ſince, regardleſs of any Coſt, they conſtantly prefer that which gives them leaſt Trouble, and condemn the reſt in the Groſs, which, notwithſtanding, proves refractory only in Proportion to their Perverſeneſs, or ſometimes, perhaps, more *private Reaſons*.

It is an arduous Taſk to diſpoſſeſs opinionative Men of their Prejudices and favourite Cuſtoms.

"Obſtinacy's ne'er ſo ſtiff,
"As when 'tis in a wrong Belief,"

Says the facetious *Butler*; hence, altho' an implicit Obedience to the preſent improved Method of compounding Fining is not to be expected, yet I ſhall reſt aſſured, that whoever adopts adops it, will never repent of his Labour. We have many Inſtances likewiſe, where Credulity and Incredulity are equally abſurd; the contumelious Accuſation of adulterating, admixing, or debaſing *Britiſh* with foreign Iſinglaſs, or, *vice verſa*, ſcarce deſerves any other Notice than Contempt; whoever underſtands Iſinglaſs, knows they will admit of no Combinations, but what are obvious at Sight; again, it has been almoſt inſiſted on by ſome, that our Iſinglaſs was made from *Sprats*; while others, inſpired with ſimilar Sagacity, inſinuate, that the whole Secret conſiſts in ſtewing down Tripe, and (Pudding-like) all the unſaleable refuſe Iſinglaſs of the Shops, in order to recompoſe it anew, under the ſpecious Appellation of *Britiſh*; ſuch are the Effects of Credulity, where fettered Genius checks the requiſite

Self-inveſtigation of Truth, or ſimple Vanity forbids Attention to the elucidating Admonitions of others. On the other Hand, Incredulity ſeems to ſtretch beyond the utmoſt Limits of *Reaſon*; for notwithſtanding ſeveral Tons Weight of *Britiſh* Iſinglaſs have been lately manufactured, conſumed, and inconteſtibly proved in a Court of Judicature, to anſwer the Purpoſes of Foreign; yet, there are not wanting certain Infidels as to this Authority, ſated, perhaps, to verify the old Adage, *That none are ſo blind as thoſe who will not ſee.* Nay, ſo firmly is this Bigotry eſtabliſhed, that I have lately been aſſured, by unexceptionable Evidence, that a certain * *Saponaceous*

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* Mr. *Cambrune* defines Wort to be a Species of Soap; or, in his own Words, *Sapo & Saponaceous Extract:* If the Definition can be admitted

ceous Brewer perſiſts to deny the Practicability of making Iſinglaſs in *England*, and repreſents the Affair as an inſidious Trick to impoſe upon thoſe leſs happy in Diſcernment than himſelf; this Circumſtance reminds me of a Story fathered upon a certain *Welchman*, who, on his Arrival at *London*, miſtaking *Britiſh Aſparagus* for *Leeks*, began to devour the wrong Ends; and notwithſtanding he was frequently admoniſhed of his Error, yet, rather than acknowledge it, continued to eat it ſo all his Life-time.

IN order to fruſtrate the invidious Cenſures, which may, with equal Propriety, be conceived relative to

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ed juſt, the Baſis of this Soap muſt be conſidered as an Acid, inſtead of Alkali, which conſtitutes that of common Soap; but doubtleſs, it will appear ſtrange to many, that Brewers ſhould make Soap and Beer at one Operation.

my

my Deſigns in publiſhing this Eſſay; I think it pertinent to declare, that no Ambition, as an Author, or lucrative Views in Publication, have in the leaſt tempted me to write; being inſtigated by no other Motives, than to place the Affair of Iſinglaſs in its true Light, and reſcue the Product of *Britiſh Manufacture* from prejudiced Imputation, and the Hands of Ignorance; and altho' I have been obliged, occaſionally, to deviate from the Subject, and make ſome little Invaſion into the Brewer's Province, yet, the Intention is not to offend, but rather, by communicative Hints, excite a further Emulation towards attaining Perfection in the Arts of Malting and Brewing, and reducing them nearer to a Standard.

The preſſing Sollicitations of ſome Friends, and the urgent Neceſſity of

Publication at this Juncture, I flatter myſelf, will apologize for ſome Inaccuracies and immethodical Digreſſions, which a due Reviſal would have corrected; and as ſimple Truth preponderates the moſt refined Colluſion, I ſubmit the Sentiments, indigeſted and unarranged as they occur, to the Candour of thoſe, whom the Subjects moſt immediately concern; and ſhall think myſelf happily recompenſed, if my Endeavours ſhould be found entitled to their Approbation.

Eaſt-Smithfield,
May 18, 1765.

ADVERTISEMENT.

WHEREAS his Majeſty has been graciouſly pleaſed to grant His Royal Letters Patent, for my new Invention of making *Britiſh Iſinglaſs*, ſtrictly forbidding all Manner of Perſons, not only in theſe Kingdoms, but in all his Majeſty's Colonies and Plantations in *America*, from making, imitating, counterfeiting, or vending the ſame, without my Conſent firſt had and obtained for that Purpoſe, as they will anſwer the contrary at their Peril, *&c. &c. &c.* And whereas the Method of preparing Fining with the aforeſaid Iſinglaſs, for the Purpoſe of clarifying Malt Liquors, ſeems to be imperfectly underſtood, I have adjudged it neceſſary to communicate the following Inſtructions, whereby the moſt perfect Fining may be made from the ſame, equal in Efficacy to that made from any Sort of foreign Iſinglaſs whatever.

H. JACKSON.

The METHOD of Preparing

FINING for MALT LIQUORS
WITH
BRITISH ISINGLASS.

PROVIDE three Vats made with Oak Wood, of a ſufficient Size [illegible] Subſtance according to the Conſumption of Fining. We recommend them to be made in a conical Form reſembling a Sugar Loaf, and to contain at leaſt four Barrels each, at the Diſtance of ſix Inches from the upper Edge or Rim; the Bottom of each Vat to be three Feet and one half in the Clear, and the Top three Feet; this Proportion will give the Vats a proper Depth and ſufficient Room to ſtir up

and

the Iſinglaſs occaſionally; each Vat muſt be provided with a pretty ſtrong Cover, with a proper Handle; the Edge of the Vats ſhould be even and ſmooth, and the Covers to lay cloſe upon them, ſo as to ſlide off and on very readily. The Vats, being thus conſtructed and bound with ſtrong Iron Hoops, muſt be let down into the Earth, all in a Line, with Room to paſs round them, under ſome Shed or other, very cool Place, ſcreened as much as poſſible from the Sun; the Vats muſt be placed ſo cloſe as to touch each other's Baſe in the Ground, and bedded with Clay; two Feet depth of the two outward Vats muſt be left above the Surface of the Ground Floor, and the middle Vat two Feet and one half; there muſt be a thick and wide Deal Board, cut into the Form of a ſhallow Gutter, to communicate from the oppoſite Sides and Edges of the Middle with thoſe of the two outward Vats, which laſt muſt be appointed for Steeping, and the Middle for Straining into, or Store Vat: Thus when the Fining is laded out from either of the outward Vats to be ſtrained into the Store Vat, the Gutters will ſave what might otherwiſe be loſt between, and return it again into the ſteeping Vats.

If that Part of the Vats left above the ground Floor be built round with nine Inches brick Work, ſo that the Surface be laid with Plank, level with the Edge of the Vats, they will ſtill be more cool and commodious. The Surface of the Plank ſhould not be covered with Lead, becauſe the Acid of Beer will diſſolve it; and Lead is well known to act as a ſlow Poiſon when taken inwardly. The Vats are placed two Feet above the Floor, in order to ſtir the Mixture, and ſtrain it more commodiouſly.

A Small Brewing Oar, a fine wicker Sieve, of that Sort commonly called * Jockey Sieves, a round Bruſh, with pretty ſtiff Hair

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* The Sort of Sieves and Bruſhes intended here, may be had compleatly made for the Purpoſe, of Mr. *Savage, a Turner, in Tower-Street*, who has already made ſome under our Direction; the Bruſh is ſo contrived as to enter into the Angle of the Sieve, and divides the Lumps of imperfectly diſſolved Iſinglaſs into very fine fibrous Parts, much more advantageouſly than by any other Method. Sieves of Wicker are more durable than thoſe of Hair or Wire; which laſt will ſoon be deſtroyed by the Acid, and the Texture of both too readily diſplaced by the Action of Straining.

about one Inch long, with a Handle upon the Top of the Bruſh, and a proper Frame to ſupport the Sieve, faſtened occaſionally upon the Frame, by means of four wooden Pins let into proper Holes, bored in the Frame, muſt likewiſe be provided.

THEN to every eight Pounds of *Britiſh* Iſinglaſs, put into either of the outward Vats, add one Barrel of very ſtale Beer, not at different Times, but all at once; ſtir them with the Oar every Night and Morning, and put on the Cover immediately afterwards; in three Days, if the Beer was ſufficiently ſtale, the Iſinglaſs will be found ſwelled into a ſurpriſing Bulk; and in ten or twelve Days it will be ready for ſtraining into the middle Vat, which afterwards may be diluted with any Sort of Beer into a proper Conſiſtence for Uſe.

REMARKS.

According to the Conſumption of Fining, a freſh Quantity of Iſinglaſs ſhould be put to ſteep in the other Vat, ſo that they may be ſtrained off alternately, and the Store Vat always repleniſhed. Where the Conſumption is very great, the Veſſels may be three Times the above Dimenſions, but ought not to be leſs in any Brewery, as they need not be filled higher than neceſſary, which will be found an Advantage in maintaining the Acidity of the Beer; and in Vats thus circumſtanced, Fining may be preſerved perfectly good and efficacious ſix Months, if required. The longer any Sort of Iſinglaſs continues in the Form of Fining, the better it divides, conſequently extends much farther; the Steeping in cold ſtale Beer does not perfectly diſſolve it, which we ſhall preſently demonſtrate.

In order to underſtand the Nature and general Properties of Fining perfectly, let us take a Survey of all Sorts of Iſinglaſs which conſtitute its Baſe; in this View, we muſt have Recourſe to plain and ſimple Experiments, obvious to the meaneſt Capacity; for the Accounts handed down to us, by all Authors who have treated upon the Method of making Iſinglaſs, are downright Deceptions, as the Manufacture has been kept a Secret in the Hands of the *Ruſſians* only, who were the firſt Inventors, and who have ſupplied all *Europe* ever ſince. Probably the firſt erroneous Account might be propagated by them purpoſely to miſlead other Nations, and ſecure the Buſineſs to themſelves, which ſeems the more credible, as they are well known to be a People ſo remarkably tenacious of their commercial Secrets, that it would be highly dangerous to the Liberty of a Stranger to attempt the Inſpection of any of their Manufactures; for ſuch is the Policy of that Country, that an imprudent Step of this Kind might ſubject him to perpetual Baniſhment, Impriſonment, or a worſe Fate; and perhaps this may account, why it has eſcaped the Obſervation of our lateſt Travellers in thoſe Parts, as Mr. *Hanway* has taken no Notice of it; and ſo ignorant are the *Ruſſian* and *Engliſh* Merchants at *Peterſburgh* in this reſpect, that thoſe who principally deal in Iſinglaſs know nothing of its Preparation, except its being made from a particular Kind of Fiſh, the very Name of which they are unacquainted with. We have formerly made all poſſible Enquiries perſonally in *Ruſſia*, from ſeveral Agents who had reſided Years in *Aſtracan*, and the Borders of the *Caſpian* Sea, where moſt of the ſhort Staple Iſinglaſs is made, who notwithſtanding were unable to furniſh us with any plauſible Idea of the Manufacture; but as this is rather a Deviation from our preſent Deſign, we ſhall refer the Remains of this Enquiry, 'till we have Leiſure to proſecute the Subject in a more extenſive Manner; therefore let it ſuffice, at preſent, to ſay, that the Method of making all Sorts of Iſinglaſs is no longer a Myſtery in *England*, which we ſhall evidently demonſtrate, as ſoon as we receive a due Supply of proper Materials from our *American* Provinces, the Rivers of which are well known to abound with an inexhauſtible Plenty and Variety of Fiſh, that will yield fine Iſinglaſs ſufficient to ſupply all *Europe*, if due Encouragement be given to promote the * Fiſheries juſt eſtabliſhed there. But as it may not be improper here to give ſome Deſcription of Iſinglaſs, eſpecially the Sorts generally uſed for Fining, the better to diſtinguiſh them from certain Matters with which they bear ſome Affinity, that notwithſtanding will not conſtitute Jelly to anſwer the ſame Intentions; let it be remembered, once for all, that all Sorts of Iſinglaſs proper for Fining are compoſed of Fibres, which appear perfectly viſible to the naked Eye when broke, or torn into Pieces, and that, in general, what tears moſt eaſily diſſolves ſo likewiſe; but is not in any other reſpects preferable to the coarſer Sorts in the Buſineſs of Fining, which take up a longer Time in their Reſolution, and which we ſhall prove hereafter. Any Subſtance which appears horney breaks ſhort, or ſnaps like Glue, altho' it diſſolves like Iſinglaſs, and puts on the Appearance of a rich thick Jelly, the univerſal Characteriſtic of good Fining, yet

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* A Quantity of *American* pickled Sturgeon being ately conſigned to us by a Correſpondent for Sale, occaſioned a very long controverted Diſpute, with the principal Officers of the Cuſtoms; when on Reviſal of the original Acts relative thereto, the Infringement of the Laws, by impoſing a heavy Duty upon it, was fully proved; in Conſequence of which, it was ordered to be deli-

delivered, and that Proceeding to be regiſtered, as a Precedent, to admit all hereafter imported *Duty Free*.

THIS was effected by a ſteady Perſeverance and Attendance in the Cauſe, during ſeveral Weeks, all other Importers of the ſame Article having for Years tamely acquieſced with the Impoſition.

yet will not fine down Beer; there are a Variety of vegetable and animal Mucilages, which reſemble good Fining ſo perfectly, as not to be diſtinguiſhed from it by Inſpection, that produce nearly the reverſe Effects in the Art of clarifying Beers; and indeed it is not difficult to demonſtrate, that even Iſinglaſs may be too much diſſolved, or its Fibres rather deſtroyed, than divided, by cold Infuſion in Liquors too acid, as well as by Inſolation. The Fibres of thoſe Sorts of Iſinglaſs, diſtinguiſhed by the Names of long and ſhort Staple, extend longitudinally in the Membrane, which is very thin, each Piece tranſmitted to us is compoſed of ſeveral implicated Membranes, in order to give it due Bulk; if either Sort be ſteeped half an Hour in cold Water, the different Membranes may be unfolded again by a nice Hand, in which State, being held up to the Light, the Fibres will be perfectly ſeen, and that Membrane, which ſplits Lengthways by tearing, and contains no tranſverſe Fibres, will * diſſolve moſt readily.

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* Altho' we do not conceive Iſinglaſs to *diſſolve* perfectly by Converſion into Fining, yet, as this Word is

THE ſhort Staple is made from young Fiſh, and the long from larger Fiſh of the ſame Species; but the ſhort might be formed into as long Pieces as the other, or into as many Yards as it is Inches long, at the Pleaſure of the Operator; when perfectly ſound, they are equally ſerviceable to the Brewer, neither can claim Preference in making more Fining, or better, if taken dry and in equal Weights. Colour is immaterial.

EVERY Species of that, commonly called Book Iſinglaſs, from being folded into a Shape, reſembling that of a Book, contains generally two or three different Coats, whoſe Fibres run tranſverſely to each other, being ſomething analogous to a thick Bullock's Bladder, or Tripe; the natural Diſpoſition of its Fibres croſſing each other in various Directions, renders it more thick and tough than the former, on which Account, it

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the general technical Term, to expreſs the Ideas of that Diviſion which it undergoes, by infuſing it in cold ſubacid Liquors, we ſhall occaſionally uſe it in the ſame Senſe, the better to be underſtood.

it cannot without ſome Difficulty be folded into the ſame Shape, and of Courſe muſt be more ſtubborn to diſſolve, as the acid Beer cannot ſo readily enter and disjoin ſuch a complicated Texture, as that compoſed of more ſimple and ſlender Fibres, neither do they diſſolve after the ſame Manner; for Inſtance, a Piece of ſtaple Iſinglaſs, being, as we obſerved before, compoſed of Membranes infolded cloſely together, the outward Part begins to ſoften firſt, then the next in Order, the Center being the laſt Part undiſſolved, which ſometimes retains its Colour and Firmneſs after the reſt are converted into a pulpous Appearance; whilſt a Piece of the Book Kind expands every where, grows ſoft, and then diſſolves all together, except in ſome particular Part where it is remarkably thick. Of this laſt Kind is *Britiſh* Iſinglaſs.

ALL Sorts of Iſinglaſs will diſſolve totally in boiling Water, ſo that nothing will remain except ſome very thin Skins, which cannot be ſeparated in the Manufacture; they will likewiſe make the moſt perfect

* Glue and Size, and one Pound of any Sort yields exactly the ſame Quantity as another, abating for the different Proportion of the indiſſoluble Skins; and this holds univerſally

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* The *Ruſſians* make all their Glue from Iſinglaſs, which is infinitely ſtronger than what is made from Vellum or Leather; Iſinglaſs likewiſe makes the ſtrongeſt Size, and is advantageouſly employed by the Buckram Stiffener, Gilder, and Paper Stainer, to fix their Colours, which are all commixed and imprinted with the ſtrongeſt Size. The fine tranſparent colourleſs Iſinglaſs, having been lately introduced into the Laundry and the Art of Clear-ſtarching, promiſes ſpeedily to aboliſh the Uſe of Starch, which has been found to hurt the Texture of Linen, by ſtiffening it too much, diſpoſing it to crack and rot; while the former communicates a fine Gloſs, and ſtiffens with a Flexibility and Tranſparency inimitable by any Thing elſe.

The ordinary Iſinglaſs, that is almoſt colourleſs, will anſwer the Purpoſe extremely well in the Proportion of two Ounces boiled gently in fair Water, ſo as to diſſolve and ſtrain off about one Quart; if the Liquor be now tinged blue with Indigo or Powder Blue, and fine Linen gently preſſed out of it and dried, it will acquire the neceſſary Gloſs and Stiffneſs, and will not ſtick to the Iron like ſtarched Linen.

Isinglass is likewiſe convertible into excellent Glue, for the nicer Purpoſes of taking off Impreſſions from Medals, conſolidating broken China, Glaſs, *&c.* by means of an imperfect Solution in ſpirituous Liquors; for ly the ſame in Fining, in which equal Quantities of good dry ſound Iſinglaſs, will turn out the ſame Proportions of Fining as to Efficacy; but ſuch as is decayed, and appears of

for Inſtance, if an Ounce of the Shreds of fine Iſinglaſs be put into a *Florence* Flaſk, with half a Pint of pellucid Proof Spirit, or equal Parts of pure Spirit of Wine and Water, and ſupported in a little Sand a few Days near the Fire in a moderate Heat, it will diſſolve, and appear of a white opake Jelly or Glue when cold; if this be poured warm upon a perfectly clean Medal, ſo as to cover its Surface, and permitted to dry gradually in the Air, it will become hard and of a horny tranſparency, and will be found impreſſed with every minute Line of the Medal, which may be gilt occaſionally, and will endure for Ages.

The Opacity is owing to the Spirit in the Menſtruum, which alone will not diſſolve a Particle of the Iſinglaſs; ſo that the Solution depends upon the aqueous Part entirely, which the Spirit prevents from being perfect and tranſparent, by coagulating in the Cold, what the other diſſolves by Heat, and thus occaſions the white opake Appearance, a Property which Spirit of Wine univerſally obtains, in Commixture with all Sorts of gelatinous Bodies, the Serum of Blood not excepted, and Glues of all Kinds are found to be ſtronger on this Account.

But if the Intention is to cement China, &c. ſo as greatly to withſtand the Heat of boiling Water, a due Proportion of the Solution of hard tranſparent reſinous Gums in pure Spirit of Wine ſhould be previouſly commixed of a rotten Texture, will fall far ſhort in either Caſe; a convincing Proof of the Truth hereof, is to treat a Pound of each Sort exactly in the ſame Manner for the Purpoſe of Glue or Size, as whatever fails in this reſpect will likewiſe fail proportionably in Fining, which is not ſurpriſing, when the Cauſes of the Defect are duly conſidered, *viz.* an imperfect Drying, which firſt generates Maggots that change into Flies, and leave a hairy Slough of the Caterpillar Kind in the Duplicatures of the Iſinglaſs, the Damage by Salt Water at Sea, which afterwards induces Mouldineſs, and diſpoſes it to putrify, and conſequently deſtroys its Fibres, in which its Virtue conſiſts. It is hoped our own Manufacture will not be charged with theſe Inconveniencies, as the Materials are

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mixed with the Glue, the recent fractured Parts of the Veſſel ſmeared over with it warm and kept compreſſed together till perfectly dry; in this Caſe, as Water cannot diſſolve the leaſt Particle of Rezins as it does Iſinglaſs, they are found to defend the Parts of the latter from its Action, and thus the Cement holds faſt. If ſimple Sawduſt, or Party-coloured obtained from different Woods, be moiſtened with this Cement and perfectly dried, the Maſs may be turned by a Lathe into uſeful Veſſels of various Forms.

are freſh and worked up all the Year round, which cannot be performed in the frozen Regions of the North.

All Sorts of Iſinglaſs now in Uſe, that are perfectly dry and ſound, differ in nothing material for Brewers Uſe, except in Point of Time, which they take up in their Diſſolution, which is always in Proportion to their Difference of Texture; the beſt ſtaple Iſinglaſs is found to expand moſt in its Solution, and take up a greater Space in Proportion to its Weight; which Phenomenon is no more than a pleaſing Deception; there are very plain Experiments to convince us, that it will not fine down more Beer, for altho' the Fining appears richer, and more in Quantity, yet it does not act in Proportion to its Bulk; the ordinary Sorts will fine down juſt as much Liquors of any Kind by due Management; the Truth of this has been well atteſted by ſome very accurate Experiments, particularly by a Gentleman of undoubted Honour and Veracity, whoſe commercial Intereſt in the Wine Buſineſs renders ſuch Objects deſerving ſtrict Attention; in all his Trials, which were made in Glaſſes, he conſtantly obſerved, that Fining made with *Britiſh* Iſinglaſs performed its Office more ſpeedily, and fell cloſer to the Bottom, inſomuch, that the Space occupied was generally in Proportion as two to three, which is not to be wondered at; ſince, by all Experiments, *Britiſh* Iſinglaſs will be found ſpecifically heavier than Foreign, being of a more firm cloſe Texture, while the Fibres of the former appear ſmall, ſlender, and eaſily diviſible; conſequently, muſt take up greater Space, either dry or in the Form of Fining: There is indeed a ſingular Circumſtance attending *Britiſh* Iſinglaſs Fining not eaſily accounted for, which is its Diſpoſition to liquify or turn thin by Expoſure to Heat, ſooner than that of Foreign, the *American Sort* of Iſinglaſs excepted; it ſeems to be owing to a greater viſcous Tenacity in the Foreign, which notwithſtanding will run thin likewiſe, if kept too warm, as frequently happens in hot Weather; ſome late Experiments induce us to think, this Viſcoſity to be the real Cauſe of preſerving its Conſiſtence better than *Britiſh*, ſince it is obſerved, that * Whites of Eggs well whiſked up, and commixed with *Britiſh* Fining, greatly prevents its Fluidity, and which acts very powerfully in the Buſineſs of Fining; but as that Addition is generally too coſtly for this Purpoſe, we hope to be able to diſcover ſome cheap Subſtitute to anſwer the ſame Intentions. As this muſt be the Reſult of Experience, we ſhall be ſilent in this Point, at preſent, except that it may not be improper to hint, that there is a certain ſaline Matter eaſily procurable, which, if commixed in the Proportion of a

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* White of Eggs differs remarkably in ſome Properties from Iſinglaſs Fining, the latter perfectly diſſolves, the

the other hardens in the Heat of boiling Water, and contains no fibrous Parts, but clarifies, upon the Principle of Coagulation, with the fœculent Matter of Fluids; the Wine Coopers prefer it to Iſinglaſs, which carries down too great a Portion of colouring Matter in red Wines, converts their purple Red into a tawney Hue, and ſpoils them for the preſent *faſhionable Taſte*, which might be deemed a venial Prejudice in another reſpect, as it is certain, that vinous Liquors of all Kinds acquire no ſalubrious Properties from unnatural colorific Admixtures; and Porter itſelf, might be deſervedly more eſteemed on the ſame Account, were it not a little difficult to give it that *genuine peculiar Smack* which diſtinguiſhes it from Ale, without a due Proportion of brown roaſted Malt, which otherwiſe had better be omitted, ſince it is eaſily demonſtrable to be of no other Conſequence.

Dram to a Barrel of Fining, greatly improves its clarifying Principles, the Rationale of which will be mentioned hereafter.

Fining is likewiſe greatly meliorated, by compounding it with equal Parts of good Foreign and *Britiſh* Iſinglaſs; that is, if when the latter is ſo far diſſolved, as to be ſqueezed by the Hand into a thick pulpous Matter, which generally ſucceeds after ten Days ſteeping, an equal Weight of the other be added to it in the ſame Veſſel, they will be found to diſſolve together, and then act more powerfully than either of them ſeparately, becauſe *Britiſh* Iſinglaſs is ſpecifically heavier, and contains leſs Viſcoſity than the other; but when thus commixed, it receives from the Foreign the ſame Principles which White of Eggs communicate; and the latter, at the ſame Time, acquires an additional Weight from the *Britiſh*. In this combined State they may be advantageouſly uſed in every Seaſon of the Year. The Incredulous may receive convincing Proofs of this ſuperior Efficacy by very eaſy Experiments performed in Glaſſes, which will be deſcribed preſently.

We obſerved before, that the longer any Iſinglaſs continues ſteeping in acid Liquors, the more effectually it divides; it is almoſt incredible what Advantages are obtained by permitting it to lay much longer than is generally practiſed, even after it has been ſtrained; no Injury can ariſe by keeping it in a covered Veſſel, the only Danger is Putrefaction; but in cloſe Veſſels, the Avolation of the ſpirituous Principle in Beer is prevented, conſequently, the Acidity maintained; for it muſt be obſerved as a fundamental Axiom, that the Converſion of all Malt Liquors into a ſtrong acetous State, depends principally upon the Proportion of ſpirituous Parts; the ſtrongeſt Wines and Beers are convertible into the ſtrongeſt Vinegars; but Vinegars themſelves ſoon loſe their Acidity, grow ropy, vapid, and putrefy in open Veſſels; mild acid Beers likewiſe are obſerved to generate Acidity moſt ſpeedily in Veſſels, not quite full; and hence appears, again, the Neceſſity of preparing Fining in large covered Vats, which thus promote the Generation of acid Parts, eſpecially in warm Weather, at which Time, the increaſing

Pungency remarkably manifeſts itſelf to Smell and Taſte; they err, therefore, egregiouſly, who out of a Principle of Oeconomy attempt to cut Iſinglaſs, as it is termed, with ſtale ſmall Beer, or the meer *Swill* of exhauſted Grains, purpoſely converted into a Kind of *Crabſour Aleager*, by Expoſure in Caſks to a whole Summer's Heat. Some Sorts of finer Iſinglaſs will, indeed, ſeemingly diſſolve in very mild acid Liquors, and conſtitute Fining; but this is a Deception in great Part; for if this very Fining be kept commixed with a little ſound ſtale Beer, a due Time afterwards, it will extend greatly farther; that is, the Fibres will ſtill become more minutely divided, and act upon Beer proportionably; for it is demonſtrable by Experiment, that if a Lump of Fining, no bigger than a Pin's Head, eſcape the Pores of the Sieve, and the Action of the Whiſk, it will fall directly to the Bottom of the Veſſel, without effecting, in the leaſt Degree, the Feculencies of Beer; the due Diviſion of Fining, therefore, requires the utmoſt Care and Attention.

To illuſtrate this Matter more clearly, let it be remembered, that the Action of all Sorts of Iſinglaſs in clarifying Liquors, is in Proportion to the Diviſion of its Fibres; that all vegetable acid Liquors, of a due Strength and Quality, will divide theſe Fibres moſt advantageouſly, to conſtitute that imperfect Jelly called Fining; for altho' mineral Acids, as * Oil of Vitriol, *&c.* by a prudent Addition, ſometimes greatly facilitate the Diviſion of the more complicated Fibres of Book Iſinglaſs, yet in general they are better omitted, as by an Error in Quantity they will prove too corroſive, and ſpoil the Fibres as well as too great Heat, by which the fining Principle of all Sorts of Iſinglaſs is entirely aboliſhed.

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* When Beer is not ſufficiently acid or eager, a ſmall Addition of mineral Acids will greatly promote the Solution, but this is better effected by a prudent Admixture of Vinegar, which is more natural and wholeſome, being a vegetable Acid: There will be no Danger of making the Fining too acid for forward Beers, as it is obſervable, that Iſinglaſs, in its Progreſſion to diſſolve, greatly deſtroys the Acid; on which Account it frequently happens, that when any Book Iſinglaſs is diſproportioned to Beer, the Acidity is overpowered, and the Diſſolution cannot proceed, which is again rectified by reſtoring the Acidity, or prevented by allowing five or ſix Gallons of eager Beer at once to every Pound of Iſinglaſs.

THAT common Fining is nothing more than a due Diviſion, or an imperfect Solution of Iſinglaſs in ſubacid Liquors, may be proved, by viewing it through magnifying Glaſſes, or by admixing a few Drops of Fining with fair Water in a Glaſs, which being held up to the Light, the Fibres may be ſeen ſwimming in an infinite Variety of Forms and Sizes, and on ſubſiding, arrange themſelves according to their different Gravities, the ſmalleſt Particles of which, perceptible to the Eye, attract each other, and form an Appearance of little Clouds; if then we take this Mixture, and warm it at the Fire, we ſhall preſently find, that all theſe Fibres will eſcape Perception, in being perfectly diſſolved, except a few groſs Parts; the ſame Phœnomena appear, if we place a little Fining near the Fire, or hold a Lump a few Minutes in the Palm of the Hand; thus the Conſtituence will be broke, the Fibres diſſolved, and the Efficacy deſtroyed: If this was not the Conſequence, we ſhould have little Uſe for Iſinglaſs in the Brewery, as any animal Jelly would anſwer the ſame Intentions, *viz.* that from Calves Foot, Hartſhorn, or Glue, which are all ſimilar in their Baſis; Jellies of all Kinds being no more than Glues half-finiſhed, and differ in nothing from common Size, except in palatable and colouring Additions, to render them more alluring to the concupiſcent Admirer.

We find by Experience, that perfect gelatinous Matters poſſeſs no precipitating Efficacy, for which Iſinglaſs is ſo juſtly celebrated; and that even the latter, which, by the boiling Heat of Water, reſolves into the moſt ſimple and perfect Jelly, is by that very Action deprived of all the ſame admirable Virtues; on the contrary, it is evident, that ſuch Additions render Liquors turbid and tenacious; or, in the Coopers Phraſe, *make it ſtubborn*; the Conſequence of which is, that Fining, however perfect, will now be deficient in Power, for whatever increaſes the Tenacity of Beer, increaſes its Weight at the ſame Time. To explain the general Cauſes of Stubborneſs in Beer, would take up too much Room here, and be foreign to our Subject; we will, however, venture to affirm, that altho' it may ſometimes be occaſioned by the Addition of Fining, damaged by imprudent Expoſure to the Heat of the Sun, or ſome warm Room, yet it is oftener produced by Miſmanagement in Brewing; altho' it is not denied, that at other Times its Source may ariſe from ſecondary Cauſes, for which the common pernicious Addition of Oil of Vitriol is rather a fancied than real Remedy.

All Sorts of Gums, ſoluble in aqueous Fluids, produce the ſame Effects on Beer, as the Jellies above-mentioned; altho' ſome Perſons, who would willingly be diſtinguiſhed for ſuperior Sagacity, have highly flattered themſelves in the Diſcovery of a Succedaneum for Iſinglaſs, through the promiſing Aſpect of the Solution of *Gum Tragacanth*, or *Dragant*, in Beer; which indeed bears ſo cloſe a Reſemblance in every reſpect to genuine Fining, as to be almoſt indiſtinguiſhable from it, except by Effect, or due Knowledge of the Subject deduced from previous Analyſis; and this is another Inſtance, which ought to remind us of the Folly and Fallacy in making too haſty Concluſions, with reſpect to the Value of Fining, merely by Appearance; for the Solution of this Gum is poſſeſſed of every Characteriſtic which commonly denotes the moſt perfect Fining; yet, upon Trial, will be found to make Beer compleatly *ſtubborn*, inſtead of fine, eſpecially if it be thoroughly diſſolved; otherwiſe it has been remarked, ſometimes to carry ſome groſs Impurities half way down; but altho' the upper Part of the Beer appears a little brightened, it will be found almoſt as tenacious and ropy, as if it had been commixed with Syrup; the perfect Combination of all other tenacious Matters with Beer, will invariably be attended with the ſame Conſequences.

Hence we find, that the Acid of Malt Liquors is the Principle which divides the fibrous Parts of Iſinglaſs; and that Beer, abſtractedly conſidered, acts only as a Medium, to convey them into the Beer to be fined; for if we ſteep Iſinglaſs, as before obſerved, a few Hours in cold Water, the Fibres ſoon become flexible, ſoft, and groſsly diviſible, but will by no Means act thus upon the Fœculencies of Liquors; but if to this Mixture we add *Stale Cyder, Old Hock, French White Wine, or diſtilled Vinegar,* the minute Diviſion of the Fibres inſtantly ſucceeds, and thus it is converted into excellent colourleſs *Forcing* for the Uſe of the Vintner, who generally, with the ſame View, ſubſtitutes his ſulphurated Stum. Good ſtale Beer is, however, deſervedly preferred by the Brewer, the Advantages of which are conſpicuous on many Accounts; as a Butt of Beer generally requires from one to two Gallons of Fining, to throw it down, as it is called; it follows, that the better the Beer, of which ſuch Fining is compoſed, the leſs it muſt affect the peculiar Taſte and Flavour of the Beer to be fined, as nothing can with Propriety be introduced foreign thereto; conſequently, Fining prepared with good Beer muſt turn out more to the Credit and Advantage of the Brewer, as well as Victualler, ſince they cannot be inſenſible, that it muſt be intimately combined with that in the Butt on commixing the Fining; on the contrary, that made with ſmall Beer, as before obſerved, frequently introduces a Putidity ſufficient to condemn the *intire Butt,* in the Taſte of the principal Conſumers of this Beverage, whoſe

Palates are generally as nice, and can as readily diſtinguiſh in this reſpect, as thoſe accuſtomed to more delicate Liquors; and of all the Diſorders to which Malt Liquors are liable, thoſe ariſing from putreſcent Matters are moſt difficult to conceal; ſtinking Butts afford daily Inſtances of this Truth. Let the Victualler therefore determine how far it may intereſt him in being aſſured, that *Britiſh* Iſinglaſs will not diſſolve to Advantage in ſtale ſmall Beer. Strong ſtale Beer merits Preference on another Account; for Iſinglaſs, like other fiſhy Matters, is greatly diſpoſed to putrefy in the State of Fining, conſequently, loſe its neceſſary Conſiſtence, and generate innumerable Animalcula, was it not prevented by the intermediate Acid of Beer, which therefore ſhould principally predominate; theſe Properties of Iſinglaſs induce us to conſider its Value on another Account; for admit, that any vegetable Matters were poſſeſſed of the ſame clarifying Principles, we ſhould preſently be alarmed with the Inconvenience reſulting from their natural Proneneſs to ferment; for all vegetable Subſtances are more or leſs fermentable, which conſequently would diſturb the Beer afreſh, and diſpoſe it to *Fret*, a Term uſed to define a Kind of ſlow Fermentation, for it is nothing elſe, and thus diſconcert our Labour; whereas Iſinglaſs, conſidered as an animal Production, is entirely unfermentable, and neither excites nor diminiſhes Fermentation, neither does it communicate or deſtroy Colour or Cloudineſs in Beer; whatever is its natural Colour, ſuch it preſerves, and does not impart the leaſt Tinge to Liquors in the Form of pure Fining, it communicates no additional Taſte nor Smell to Beer; ſometimes indeed, in its Reſolution into Fining, as ſoon as the Fibres of the Iſinglaſs begin to unfold themſelves, a very ſmall Portion of its natural Oil, perceptible to Smell only, manifeſts itſelf, which before was ſo cloſely locked up in its Parts, as to be inſeparable in the Manufacture; but this ſoon diſſipates as the Solution advances, and if it did not, it would float at the Surface of the Beer, in the Butt, Oil being incommiſcible with it; in ſhort, pure Iſinglaſs is perfectly inodorous and inſipid, and remains quiet at the Bottom of the Caſk after ſubſiding, unleſs diſturbed by Violence, or the Supervention of that natural inteſtine Motion called Fretting, peculiar to all fermenting Fluids, which ſometimes ariſes very ſuddenly, when ſultry rarified Air is ſucceeded by Thunder and Lightning; and from hence ariſes the vulgar Obſervation, that *Thunder ſpoils Beer*.

Somewhat analogous hereto, is that Fretting, or rather Efferveſcence which we induce by Art; if we take a Glaſs wherein a Gallon or Two of Beer has been fined down two or three Days, and the Fining ſo cloſely ſubſided as to reſemble a Cake at the Bottom, and then place the Glaſs upon any Thing moderately warm, or in the Sun, the Heat will preſently rarify and expand the elaſtic Air in the Beer; Bubbles of which will be impetuouſly propelled upwards, elevate the Fining, and carry it unbroken to the Surface, where it will remain buoyed up ſo long as the impulſe of the Air Bubbles continues; and on Removal into a colder Situation ſubſide again to the Bottom; but if the Fining ſhould be broken by external Commotion, Agitation, or violent Fretting, during the Influence of the Heat, the Beer will not become ſo bright again as before, neither will the Fining fall ſo cloſe, as in this Caſe; ſome Part of the Fining being perfectly diſſolved by the Heat, the Beer will be rendered proportionably ſtubborn, or ſpecifically heavier than it was before; the Truth of which any incredulous Perſon may be convinced by Experiments with the hydroſtatic Balance, which demonſtrates the different ſpecific Weight of Fluids with the utmoſt Accuracy and Preciſion. This Account may prove a uſeful Hint to the Cellar Man in more Reſpects than one, but enough of this.

HAVING now deſcribed the conſtituent Parts of the various Sorts of foreign Iſinglaſs, and the Congeniality of *Britiſh* therewith, together with the Compoſition of Fining; let us now conſider what it is that renders Beer turbid and opake, ſo as to require the Aſſiſtance of Fining, and its Manner of Action in rendering it fine and Bright; we ſpake here to general, not to particular Appearances of Beer; for although we are perfectly acquainted with the various Sources, from whence the different Degrees of Cloudineſs in Beer ariſe, and that from a due Knowledge thereof, we are enabled to ſeparate and reſtore the Defect at Pleaſure; yet, it is well known, that this Diſgrace to the Brewers Art, is not to be eliminated by Means of Iſinglaſs; the Subject is too nice and ſpeculative to be handled here, yet it may not be improper to affirm, from Experience, that the prevalent Miſchief is much eaſier prevented than remedied, and that Mr. C****, the preſent Profeſſor in Brewery, amongſt many other Matters of equal Importance, is moſt egregiouſly miſtaken in his Doctrine relative to the Cauſes thereof.

THE Fœculencies of all Malt Liquors, except that called Porter, ſpontaneouſly ſubſide, and require no Aſſiſtance from precipitating Matters; the Conſideration of this Circumſtance may naturally lead to the Queſtion, How and by what Means does Porter particularly become impregnated with this ſuperabundant Quantity of fœculent Matter, which is ſo perplexing and expenſive to ſeparate? A Queſtion of ſome Importance, but the Solution being foreign to our Purpoſe, an Examination of its Exiſtence and Properties ſhall ſuffice at preſent; if we take a ſmall a ſmall Quantity of Beer, which requires Fining, and filter it thro' a Cone of Paper, or Piece of Spunge, we ſhall find a brown coloured Matter, conſiſting of various ſized Particles, left behind, of which the Beer, being now diveſted, aſſumes an agreeable Tranſparency equal to that produced by Iſinglaſs; there cannot then be a more convincing Proof, that the prior turbid Appearance of the Beer was occaſioned by the Particles of the ſeparated Matter, which, being of the ſame ſpecific Gravity, were every where intermixed with it, and of Courſe could not ſubſide ſpontaneouſly; now if it be remembered, what we have all along advanced, that the Value and Operation of Fining, depend principally upon the minute Diviſion of the Fibres of Iſinglaſs into an imperfect Jelly, we cannot remain long in Suſpence, before we comprehend the Manner by which Fining carries down the fœculent Matter of Beer, and leaves it perfectly bright.

It may be objected here, that we labour to little Purpoſe to inculcate by Theory, what is daily obſerved in Practice; that as Beer is well known to become bright by common Admixture with Fining, the Mode of Action is very immaterial; but this is the grand Miſtake which Arts and Artiſts generally labour under; it is almoſt impoſſible, that any conſiderable Improvements can be made in Arts, without a juſt and comprehenſive Theory of the Principles which conſtitute them ſuch, ſingly and jointly conſidered; otherwiſe, when any Thing new and intereſting ariſes in Practice, the Diſcovery muſt ſtand indebted to Chance only; whereas, by a well eſtabliſhed Theory, the Artiſt can generally predetermine the Succeſs of the different Modes of Application, or Treatment of his Subjects, eſpecially in thoſe Arts, where the happieſt Conſequences ariſe from a due Regulation of Fire and Heat; if we refer the Argument to Example, every one knows, that an Infuſion of Malt made with Water of a proper Heat, and impregnated with the bitter Extract of Vegetables, will ferment with Yeaſt, and yield a Species of vinous Liquor, which will inebriate, *&c.* but every one does not know how to extract, combine, and conferment theſe Principles to the beſt Advantage, eſpecially, where the Art is reduced to a Buſineſs, and the Emoluments depend upon the due conducting thereof; therefore, notwithſtanding the Art of Brewing is every where practiſed, and in the Hands of many become a neceſſary Employment in the Oeconomy of Life, yet it muſt be acknowledged a chemical Proceſs throughout, and no leſs curious than important; for it is Chemiſtry alone that teaches us to analize Vegetables, and reſolve their Component into ſimple Parts, to ſeparate thoſe fitteſt for our Purpoſe, and reject the reſt, or to recombine the whole, admix them with others in certain Proportions, ſo as to form new Compounds to vary according to the Intention of the Operator; in ſhort, in the Practice of Brewing it directs what to extract and what not, how to prepare and commix the proportionated Extracts to be farther aſſimilated by the moſt amazing combinatory Power of Fermentation; which Phœnomenon, although of the utmoſt Conſequence in the Art, with reſpect to its primary Cauſe and conſequential Laws, is, perhaps, leſs underſtood than any other Part of the Proceſs; Yeaſt, likewiſe, and the Principles which conſtitute it a univerſal Ferment, ſeem to lay immerged in the ſame

Obſcurity; we know of no Author who has given an Analyſis of its Parts, which alone muſt be referred to Chemiſtry; and whoever attentively conſiders the Subject theoretically, and regulates his Practice deducibly therefrom, will find it deſerving the moſt narrow Inſpection in other Reſpects, beſides Quantity and Quality, throughout the whole Buſineſs, from the guyle Tun, to the Fining of the Beer for Uſe. Much more might be advanced upon this intereſting Subject, which we hope will plead for this Excurſion, as the principal Intention here, is to prove the abſolute Neceſſity of Theory in every Department cognizable in the Brewery; indeed, a very late Author, in an expreſs Treatiſe upon the Art of Brewing, has ſtrenuouſly endeavoured to concatenate Practice and Theory, in a View to eſtabliſh a new Syſtem, after the Method laid down by Boerhaave, and Dr. Shaw, in ſome of his Eſſays; the Attempt is laudable, altho' he has not equally ſucceeded. The Reaſon ſeems obvious, one appears eminent as a practical Brewer, the other as a maſterly Chemiſt, who notwithſtanding never attended the *Copper Side*, yet deſervedly ranks without Com-

petitor,

petitor, ſo far as relates to a perfect Knowledge of the Subjects, and their preparatory Addreſs for ſubſequent Fermentation. Both Authors evince the Neceſſity of the Point in Diſpute, and notwithſtanding the Art has made haſty Strides towards Perfection, yet we can add, with ſome Authority, that he who is thoroughly verſed in a true and rational Theory, as well as Practice, in Brewing, will be enabled to obtain a conſiderably greater yield of eſſential Matter with * Certainty, from any Quantity of identical Materials, than he, who proſecutes the Affair in an old hackneyed Track or random Method, and may likewiſe actually prevent the common Defects in his Product, ſince it can be demonſtrated, that thoſe attributed to Accident, ariſe principally thro' Miſmanagement; and theſe are no ſmall Advantages, where Avidity of Lucre ſtands confeſſedly the predominating Object.

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* The different Strength of Beers can be eſtimated with Accuracy by Diſtillation in Veſſels, peculiarly adapted for that Purpoſe; all the inflammable Spirit reſiding in a Quart, or leſs Quantity of Beer, can be ſeparated in half an Hour; conſequently, the Yield of ſpirituous Parts contained in a Variety of Guyles, can be aſcertained in a ſhort Space of Time.

The Neceſſity of a well atteſted Theory, appears equally intereſting with regard to Iſinglaſs, and Fining; every Purchaſer endeavours to form to himſelf a right Judgment in the Choice of the former; yet how ſtrangely do Conceit and Prejudice operate here likewiſe for want of Theory.

The Seller recommends upon external Appearances, the Buyer compares theſe with ſimilar Kinds of a former Purchaſe; one prefers ſhort, another long, another Book Iſinglaſs, while others Value upon Colour and Tranſparency, and condemn the very ſame Thing preſented under a new Form, indiſcriminately, as indiſſoluble, *&c.* Theory at once decides the Controverſy, and proves, that all the Species are producible from one and the ſame Fiſh, and convertible into Fining of equal Efficacy under a prudent Regulation; the ſame Ignorance prevails with regard to its Mode of Action; one conceives Fining to form a Kind of Cloud in Beer, which carries every Thing down by its own Weight; another imagines it to act like a Strainer, in the reverſe Way, which being put into the Beer, falls like a weighty Sieve, permitting the fine Parts to ſtrain thro' upwards, in Proportion as it carries the groſſer downwards; a third confines its Operation to a gelatinous Principle or Viſcoſity, which, like Birdlime, entangles every Thing in its Way, *&c.* Hence we find, generally, as many Conjectures as Operators in the Buſineſs; a Similarity of Knowledge has hurried others into as many abſurd Whims, to diſcover a Succedaneum for Iſinglaſs; thus *Glue*, *Size*, *Sago*, *Salop*, *Gums of various Sorts*, *Milk*, and even *Clay*, have been employed as great Secrets to precipitate the Fœculencies, and remedy Cloudineſs in Beer; certainly, a previous Enquiry into the Nature of the Subjects would have prevented theſe chimerical Purſuits; in ſhort, *Cloudineſs of Head* ſhould have been attempted firſt.

THE incongruous Variety of Practice which prevails in Brewing is amazing, and extremely difficult to enumerate, but infinitely more ſo to reconcile, and reduce to a Syſtem producible of the ſame general Effects intended. This, indeed, would require an expreſs Treatiſe alone; we ſhall, therefore, juſt particularize a few Inſtances to confirm the Obſervation, and ſubmit the Inferences deducible therefrom to be handled by others; thus, we find, the Heat of the preparatory *Liquor* is variouſly regulated by the Senſation of the Hand, Thermometer and *Cooling in*, as it is termed, to a certain Mark; the Liquors *turned over intire or pieced*, gradually increaſing in Heat, from firſt to laſt Maſh, and *vice verſa*; ſome pay little Regard to the Heat of the Atmoſphere, Effervеſcence, *&c.* while others are ſo ſcrupulous exact in this reſpect, as to calculate, with the Accuracy of an Algebraiſt, the inconſiderate Heat ariſing from Commixture of *hot Water with hard Corns*; to anſwer a Sameneſs of Intention, one prefers old, another new Hops, the Method and Time of Boiling are likewiſe variouſly directed in cloſe covered and open Veſſels; one cleanſes with a *yeaſty Head*, another without; ſome conduct the Fermentation with a free Admiſſion of external Air, and without Diſturbance; others favour the reverſe Practice; while others again fancy the Buſineſs promoted by fanning the circumambient Air upon the Surface of the fermenting Muſt, and previous to *cleanſing*, conquaſſate the whole Aggregate with a *Rouſer*.

NUMEROUS ſimilar Differences in Practice might be inſtanced, and we may venture to remark, that amongſt five hundred Practitioners, there are not two who treat the very identical Materials alike, notwithſtanding all aſpire to make the moſt of the Subject; hence it ſeems evident, that every injudicial Method in Practice, muſt ariſe from certain Miſcomprehenſion of the conſtituent Principles which form the Baſis of Malt Liquors, and Inattention to the Laws which govern vinous Fermentation; ſince it is beyond Diſpute, that there can be one ſcientific Method, only, of conducting the Buſineſs to Advantage, whether we regard Diſpatch, Perfection, or Profit; perhaps the *Deſiderata* might be demonſtrated experimentally, did not opinionative Self-ſufficiency of ſome interdict; while others conceive it degrading to their Dignity, to liſten to another's Inſtitutes.

IT may be deemed a violent Inſult upon the Underſtanding of an experienced Brewer, to tell him, there are certain Principles reſident in Malt and Hops, which he does not conceive, or has never ſeen (for the Nature of his Practice will not admit of it) yet, however abſurd this Aſſertion may ſeem, we can aſſure him, *the Things are ſo.*

We are aware of the Objection, which may naturally enough be ſtarted here, relative to the different Qualities of Malt, occaſioned by different Degrees of Heat ſuſtained in its Preparation, conſequently, that different Modes of extracting its Contents are abſolutely neceſſary. We admit, that due Diſtinction ſhould be made between the mellaginous Sweet of Pale, and the Coffee-like Extracts of brown Malts, but can by no Means ſubſcribe to the Rule of impreſſing them with increaſed Heats proportioned to their Dryneſs, as that is a meer hypothetical Doctrine, unſupported by well eſtabliſhed Facts; ſince it is eaſy to prove experimentally, that the Author thereof is groſsly miſtaken in his *fundamental Axiom*; and that Malts, ſo far from being * charred by Heat, equal to boiling Spirits, will not blacken in the leaſt, at that of boiling Water, which is thirty-ſeven Degrees hotter; but admitting the Hypotheſis true, the beſt Mode of recombining the various Extracts afterwards, to anſwer all the *Deſiderata* of the Brewer, merits infinitely more ſerious Attention.

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* Vide *Combrune*'s Eſſay on Brewing.

It may not be impertinent here, to ſubjoin an Obſervation or two relative to the general imperfect * Practice of Malting, which is a Proceſs as variouſly and whimſically conducted as the former, under different Hands, although with the ſame lucrative Intentions, we ſhall therefore hazard a ſecond a ſecond Imputation of Incapacity in this reſpect, as on a former Occaſion, when the principal Objection to our intended public Elucidation of certain intricate Mattters in the Brewery, conſiſted in the ſimple Interrogative, *viz. How ſhould a Chemiſt underſtand Brewing who never ſaw the Side of a Copper?* Profound Dehortation! Hence, when we preſume to tell the Malſter, that his Malts are imperfect, and his Art capable of great Improvement, he may with equal Propriety aſſume the ſupercilious Sneer, and demand the Poſſibility of a Chemiſt's Knowledge in Barley, who never ſaw the *Couch of a Malthouſe*; the Chemiſt, however, is not aſhamed to tell him, that the Ciſtern Liquor, wherein he has ſteeped his Grain, will ferment and yield an inflammable Spirit by Diſtillation; conſequently, that his Subject is robbed in Part of its eſſential Principles in the very firſt Part of his Proceſs; which Chemiſtry teaches to prevent, points out a Way to dry Malt without Detriment from any common Fewel, and proves the Doctrine of Grain, being malted in Proportion to the Extent of the Plume only, within the Tegument, erroneous. The Chemiſt can likewiſe demonſtrate, that the farinaceous Part of the Grain upon the Couch, is to the Acroſpire, what the Yolk of an Egg is to the Chick in its embryonated State, and that not a gueſſed, but certain Regulation of Heat, the univerſal Agent, determines the Fate of both, which may prove a pregnant Hint, if duly conſidered, towards Perfection in the Art, but as the Malſter may conceive himſelf already compleat in this reſpect, the following Queries are addreſſed to his Conſideration:

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* We have lately peruſed a ſmall Tract juſt publiſhed upon the Art of Malting, wherein the Author ſtrenuouſly recommends the Uſe of what he calls *long Malts*, which he ſays, will anſwer every Principle which the Brewer and Conſumer could deſire. It would have afforded us no ſmall Satisfaction to have ſeen the Subject handled in a more rational and ſcientific Manner, as it certainly opens an ample Field for Speculation and Experiment. The Author's Arguments appear generally inconcluſive, being ſupported with no better Authorities than his own *ipſe dixits*, and the conditional Propoſal to revive the making a Sort of Beer, called *Bullocks Blood*; however lucrative the Secret, we are afraid will rather decry than add to the Reputation of his Performance.

1. DOES the ſaccharine Matter of Malt lay concealed in the Grain originally, and brought to Light in an exalted State by Malting? Or is it a Thing generated a-new by the Proceſs?

2. IF the ſoluble Parts of Malt in Brewing conſiſt of the aforeſaid ſaccharine Matter, mealy Part of the Grain, or both, what is the Reaſon that the Proportion of the firſt cannot be increaſed, eſpecially if generated, and the whole of the latter, or at leaſt a much greater Share than common,

be made diſſoluble under the ſame Circumſtances as well as a Part?

Till the Malſter can demonſtrate by Experiment, for we pay little Regard to any other Proof, the Impracticability of theſe Things, we ſhall deem his Art and Malts defective: Perhaps a cool Reflection of the Poſſibility of increaſing this Yield of fermentable Matter, by ſome certain *Encheireſis*, or peculiar Treatment of the Grain, might induce the Malſter to conſider the Nature of *ſeminal Vegetation*, and the Art of Malting in a new Light; but Purſuits of this Kind are ſeldom attended with Succeſs, without the *Index* of Chemiſtry. A due Attention to what has been advanced will not only ſhew, that the preſent Arts of Brewing and Malting are improveable; but that the Apparatus of both are defective in Contrivance and Durability; we ſhall therefore juſt touch upon a few Particulars by Way of Hint, to excite a proper Enquiry into theſe Matters, by thoſe who have Leiſure and Delight in the Proſecution of ſuch Subjects.

THUS, in the Buſineſs of Malting, it ſeems a *Deſideratum* to increaſe the peculiar Sweet of the Acroſpire, and attenuate the mealy Part of the Grain, ſo as to yield all its Contents ſoluble, by Way of Infuſion, and leave nothing but the exhauſted Plume, and meer-inert Huſk behind.

TO dry all Sorts of Malt with any Sort of Fewel, without impairing its Strength, Colour, or Flavour, with certain Methods of improving the latter.

TO malt ſmall and large Grain in equal Perfection, and in Proportion to their Contents, ſo that the firſt may not turn out what is called, *Steely*, nor the latter, *Blown*.

TO prepare the Grain for ſprouting without Loſs of Subſtance, the Conſequence of *Steeping* by the preſent Practice, *&c.* *&c.*

TO conſtruct a Kiln upon ſuch Principles, as to dry all the Parts of the Grain equally without ſcorching or charring, which deſtroys the fermentable Matter proportionably.

To prove analytically the * Conſtituence of Malts, the Proportion which the ferment-

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* It is the Character of a Chemiſt, ſays a learned Author, that his Speculations paſs on to Effects. Chemiſtry teaches a peculiar Method to ſeparate all the mellaginous Sweet of Malt, without touching its *Farina*, the ſoluble Parts of which laſt can afterwards be aſcertained by this Enucleation with Preciſion, hence we are enabled to determine the Eſtimate of Malts with Certainty; but indeed, the Criterion of their Perfection may be demonſtrated by various Means, preferable to the popular indecent Method by Maſtication, which, at beſt, is no leſs fallacious, than the Prejudgment formed upon its Sinking or Swimming, Weight or Meaſure. Our Limits will not admit an Elucidation of theſe Matters at preſent, but they may hereafter prove the Subject of ſome future Eſſay; in the mean Time, whoever is deſirous to wade deeply into ſuch Reſearches, will find great Light thrown upon them by *Boerhaave*, in his *Elementa Chemiæ*, *Junker*'s *Conſpectus Chemiæ*, *Vogel*'s *Inſtitutiones Chemiæ Wallerius*, a *Swediſh* Chemical Author, and particularly, on Fermentation, by *Stahl*, in his *Zymotechnia Fundamentalis*, *Collegium Chemicum*, and by Dr. *Shaw*, in his Chemical Lectures, Eſſays, &c. Some uſeful Hints relating to the improved State of Malting, may alſo be found in the *German Ephemerides*, *Glauber* and *Boyle*. The *Philoſophical Tranſactions* likewiſe contain ſome uſeful Papers upon the Subject, ſo do Mr. *Evelyn*'s, and Dr. *Merret*'s Works, and from Mr. *Combrune*, the lateſt Author upon Brewing, may be collected many uſeful Hints towards a further Advancement of the Art.

able Parts bear to the reſt, their Nature, Suſceptibility of the inteſtine Motion of Fermentation, and the beſt Methods of promoting and checking it, explained, with a rational Account of the Tranſmutation of the Sweet and Bitter of Malt and Hops by the Action; and how far the Extract of the latter combined with the former, may contribute to the Generation of ſpirituous Parts, conſequently, the proper Choice of Hops demonſtrated.

In the Brewery, ſeveral intereſting Problems preſent themſelves, particularly with regard to the Conſtruction and Preſervation of Utenſils, the Solution and Reduction of which, to general Practice, might turn out to great Advantage in Diſpatch of Buſineſs, and leſſening the Expence of the preſent coſtly Apparatus: In this View the following Heads ſeem to merit principal Conſideration.

1. ENQUIRY into the beſt Method of improving the common Maſh Tun, in order to impreſs the whole Volume of Malt with one uniform Heat during the Infuſion, aſcertained by the Thermometer, and in a

View to ſhorten the Proceſs by extracting all the neceſſary Contents of the Grain at two Maſhings.

2. ENQUIRY into the beſt Conſtruction of a fermenting Tun, in a View to obtain a greater yield of ſpirituous Parts, from any given Quantity of Wort, by Means of a peculiar *compreſſed Fermentation*, and for conducting the Buſineſs all the Year to Advantage.

3. ENQUIRY into a practicable Method of cooling an entire Guyle at once, in one Veſſel, in any Seaſon, and in a ſhort Time.

4. ENQUIRY into the beſt practicable Methods to prevent the larger Utenſils from Decay, and preſerve them ſweet without Lime, during Summer Vacation.

5. AN Attempt to harden Fir Staves, by certain cheap facile Treatment, render them ſweet and durable as Oak, and in every reſpect as proper for making Butts, Barrels, *&c.*

6. To diſcover certain facile Methods of rendering common Butts more durable, and effectually defending them from the ill Effects of damp Walls, Cellars, *&c.*

7. ENQUIRY into the true Cauſe of Muſtineſs, and what is called *Stink* in Caſks, with certain cheap Methods of Prevention and Cure.

CHEMISTRY not only points out the direct Road to a ſucceſsful Diſcovery of theſe *Deſiderata*, but might inveſtigate many others of a ſimilar Nature, no leſs important, if Proſecution to Proofs was duly encouraged; but few Individuals have Spirit to reward, where Community muſt reap equal Advantages; and what an arduous Difficulty it is to obtain unanimous Approbation from the latter, we have recently experienced in the Affair of Iſinglaſs, wherein the moſt importune Sollicitations ſcarce avail to render the Manufacture expetible, notwithſtanding the conſequential Emolument to the Brewery in general, is univerſally acknowledged. Such are the Effects of capricious Oppoſition! Let us however reſume our former Subject, and endeavour to confirm what we advanced by way of Theory, relative to the Action of Fining upon Beer, and prove, as propoſed, the Rationale thereof by Experiment.

The Art of clarifying Liquors with Iſinglaſs, was firſt diſcovered and practiſed by the Chemiſts, afterwards recommended to the Wine Coopers, who accuſtomed themſelves formerly to beat the Iſinglaſs with great Labour upon an Anvil, to facilitate its tearing into ſmall Shreds, in which State it was put into the Wine, ſtirred in the Veſſels till it was diſſolved, and afterwards by Subſidence the Wine converted bright: With the ſame Intentions, ſome have erected Machines for cutting Iſinglaſs into ſmall Pieces; but later Experience has convinced them of the Inutility of this preparatory Buſineſs, which a juſt Theory would have at firſt expunged.

The Effects of Fining upon Liquors are beſt perceived in tranſparent Glaſs, as by its means all the Phœnomena are preſented to our full View, and we not left in the Dark to form uncertain Ideas and Concluſions of its Power and Failure, which naturally reſult from Experiments in Caſks: Provide therefore a cylindrical Glaſs, about five Inches diameter, and two Feet long, which may be eaſily procured at the Glaſs Houſes; let it be made pretty ſtrong, with a narrow Rim, that it may be laid over with a Cover occaſionally, and likewiſe have a glaſs Cover fitted to it like what the Confectioners uſe. Let a ſmall Whiſk be prepared, by ſtripping off as many ſlender Twigs from a Birch Broom, or common Whiſk, as will give it the Thickneſs of half an Inch in the Middle, where it is to be tied round with Packthread; draw off as much Beer out of the Butt, intended to be fined, as will fill the Glaſs within four Inches of the Top, then beat up about ſix Spoonfuls of Fining in a Baſon, with the Whiſk, a few Minutes by itſelf; after which add gradually a little of the Beer in the Glaſs, and whiſk it again till it appears very light and frothy; ſtir the Beer about briſkly in the Glaſs, and immediately pour in the Fining, and commix them very well, put on the Cover, and place the Glaſs in a good Light; as ſoon as the Mixture has loſt its vertical Motion given it by ſtirring, innumerable little Maſſes, reſembling brown-coloured Curd, may be perceived to form and move in various Directions throughout the whole Liquor, which every Moment increaſe in Magnitude, till at length they ſeparate at conſiderable Diſtances, and ſome Parts fall down to the Bottom, while others aſcend to the Top, on Account of ſome Air Bubbles, confined in the curdled Matter, which, on breaking at the Surface, fall directly to the Bottom; but if the Air is not diſcharged, the Curd will be ſuſpended thereby, and form a Kind of Scum; if the Fining is good, and the Beer in proper Condition to receive it, that Part in the Middle of the Glaſs will become of a blackiſh tranſparent Hue in a ſhort Time, and if prudently drawn off by a Syphon will be found very bright; in twenty-four Hours the Fining will ſettle pretty cloſe to the Bottom, and very little remain at Top, unleſs the Beer be in a fretting State, which we obſerved before to be nothing but a ſlow Fermentation; in which Caſe the Fining will be carried tumultuouſly up to the Surface, by Means of the vaſt Number of Air Bubbles perpetually generating and aſcending in all fermenting Fluids; but as ſoon as that Action is over, the Fining will fall to the Bottom, and produce its proper Effect, eſpecially if a ſmall Addition be ſlightly ſtirred in at the Surface the next Day, with Caution not to diſturb what is already ſubſided, and which, indeed, ought to be the general Practice where Beer is required perfectly bright and fine; thus, it is evident, that at the very Inſtant that Fining is commixed with Beer to be clarified, the ſtale Beer, in which the Iſinglaſs was diſſolved, or divided, quits the Fibres, unites unites with the Body of the Beer; while at the ſame Time the Fibres, now ſet looſe, and every where interſperſed in the Beer, attract and unite with the looſe fœculent Particles, which before this Union, being of the ſame ſpecific Gravity with the Beer, could not poſſibly ſubſide alone, but by this reciprocal Attraction having obtained an additional Weight, are now rendered proportionably heavier, and precipitate together of Courſe in Form of the curdly Magma juſt mentioned. But it ſometimes happens from certain Inadvertencies in Brewing, and Miſmanagement in the Cellar afterwards, that

Beer turns out ſpecifically heavier than the Fibres of the Iſinglaſs; in which Caſe the Fining cannot ſubſide for the Reaſons aforeſaid, but floats at the Surface; at other Times, notwithſtanding the Union of the Fibres and Fœculencies, the combined Matters becoming exactly of the ſame Weight as the Beer, continues interſperſed every where in it, and neither emerges nor ſubſides; in both Inſtances the Beer is nicknamed *Stubborn* by the Coopers; Recourſe is now had to a Variety of Noſtrums to remedy the Diſeaſes, and he who has the happieſt Knack of curing *Stubbornneſs* is accounted the principal *Beer Doctor of the Faculty*; we have before obſerved, that the Cure is often made worſe than the Diſeaſe, by imprudent Additions; the general Practice of this Sort of *Phyſic*, is to treat the *Patients* with large Doſes of *Oil of Vitriol*, reputed the moſt excellent *Cordial*; other *Practitioners* adminiſter repeated Doſes of *ſpecific Powders*, as *Antimony*, *Alabaſter*, *Sand*, &c. in a View to entangle with the Fining, and, as it were, drag it down.

BUT if they are not too *ſtubborn* themſelves, let them remember, that ſuch ponderous Matters are ridiculous Additions, as they fall directly to the Bottom, without producing any Thing like the intended Effect; and altho' mineral Acids ſometimes promote the Buſineſs a little, yet a due Conſideration of their Inſalubrity, we ſhould imagine, would be ſufficient to ſuppreſs the Practice; perhaps, it might be worth Trial, to draw off a Quantity of ſuch ſtubborn Beer, and mix it with an equal or greater Proportion of ſuch as is known to be thin, light, and fine, and thus by leſſening the Gravity of the former, the Fining will naturally ſubſide, for obvious Reaſons; if the Beer is in a fretting State, the Bung muſt be left open till that Action is over, and then the ſame happy Conſequences will enſue; but if the Diſeaſe ariſes from Cloudineſs, the aforeſaid Remedies will prove ineffectual; the *Patient* will require a quite different *Regimen*.

As it is more commendable to prevent by Inſtitution, than cure Diſeaſes by empirical Practice, we recommend to theſe celebrated Practitioners a previous Examination of their *Patients State and Condition* before they preſcribe at large; in this View, we likewiſe adviſe them to a ſerious Peruſal of our new-invented *Proof-glaſſes*, which are made of the beſt Glaſs, and contain about two Quarts each, with a Mouth about one Inch and half, and Bottom three Inches Diameter; their Form is pyramidal, the better to prevent the Fining from adhering to the Sides, and examine the Colour of Beer under different Denſities.

Thus if we want to know the Condition of different Guyles or Butts of Beer, a Glaſs muſt be appointed to every Butt, which muſt be marked or numbered; each Glaſs muſt be filled two thirds full or more with the reſpective Beers placed in a good Light, and the Taſte, Colour and fretting Diſpoſition firſt examined; then having a little good Fining ready whiſked up in a Baſon, as before directed, put into each Glaſs a common Spoonful by Meaſure, with the uſual Precautions; twiſt a little Paper over each Glaſs, and let them ſtand quiet; in a ſhort Time, any Perſon of tolerable Diſcernment will perceive what Beer, according to the common Phraſe, falls kindly, or turns out ſtubborn, proves cloudy or fretting, high or low coloured, &c. he will likewiſe perceive what Quantity of Fining is neceſſary for one Sort more than another, the Difference of Time in becoming bright, and furniſh himſelf with the moſt eligible Methods of redreſſing general Defects; and thus by Experiments in the ſmall Way, he will be enabled to form right Prognoſtics, and may ſafely proceed to the large, for whatever * Phœnomena occur in the Glaſs, will turn out exactly the ſame in the Butt, due Regard being had to Difference in Proportion.

By the ſame Means he will likewiſe be impowered to reconcile the long controverted Queſtion, relative to the different Merit and Efficacy of Fining, made with *Britiſh* and foreign Iſinglaſs; but the larger Kind of

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* It muſt be remembered here, that where the utmoſt Nicety and Regularity is required, the Beer in the Butt muſt be previouſly ſtirred up with its Lees, before it is eſſayed in the Glaſs, otherwiſe a correſponding Proof muſt not be expected in the Butt, as the Proportions of Lees in Beer makes a very material Difference with reſpect to Fining.

Glaſſes are moſt commodious to determine this Diſpute, in which he muſt baniſh all Prejudice and Partiality, and not like the faſhionable Multitude (undeſerving the Dignities of *Engliſhmen*) implicitly adopt or prefer every Thing intruded upon us by Foreigners, to the manifeſt Abuſe of their Conſcience, and Diſſipation of national Wealth. To return, a due Regard muſt be had to the Conſiſtence of the different Fining, and that it be exactly ſimilar in this reſpect tried upon Beer from the ſame Butt, and in cold Weather, a Time when all Sorts of Fining are moſt efficacious. Thus by a narrow Inſpection of all the Appearances and Modes of Action of Fining, the Cooper will be convinced of many important Matters neceſſary to his Profeſſion; for Inſtance, he will no longer remain in the Dark about any dubious Property of Beer, Fining, or meliorating Noſtrums; becauſe he may at Pleaſure elucidate the Difficulties by eaſy Experiments, which at the ſame Time will convince him of the Truth of our Theory, conſequently, enable him to aſſiſt the Victualler, and rectify his Complaints with Certainty, to the Credit and Emolument of themſelves, as well as the Brewer in particular; he will ſee the Imprudence of conveying Fining to public Houſes in *Pails* expoſed to the hotteſt Sun, or placing the Veſſels too frequently in warm Tap Rooms, whereby a perfect Solution takes Place previous to the Commixture with Beer, and of Courſe avoid the common Complaint of *Stubbornneſs*, the Inefficacy of Fining, *&c.* and receive convincing Proof, that Iſinglaſs of *Engliſh* Manufacture has been undeſervingly depreciated; he will perceive likewiſe, perhaps, contrary to his Expectation, that all Fining begins to operate by curdling with the uncombined Fœces of Beer; and hence form ſome Hints relative to the Powder before-mentioned; ſince it is eaſy to conceive, that whatever promotes the coagulating Diſpoſition of Fining, muſt of courſe increaſe the precipitating Power preferably to the inconſiderate Addition of indiſſoluble ponderous Bodies, and that there is no Neceſſity to imbrew the unwholeſome Solution of *vitriolic* Salts to give the Beer a proper *Head*, as it is called; in ſhort, repeated Trials with the Proof-Glaſs will exerciſe his

Reaſon to argue according to Obſervation upon Facts, and not condemn in the Groſs by haſty Concluſions, which are generally the Reſult of Ignorance, Inattention, or Malevolence. The Proof-Glaſs is applicable to many other Purpoſes obvious enough to the Diſcerning, therefore, needleſs to enumerate here.

It has been remarked already, that Iſinglaſs, in the Form of Fining, neither communicates or receives any Colour to or from Beer; yet we have been informed, that ſome whimſical Victuallers have objected againſt *Britiſh* Iſinglaſs Fining, on Account of its pale Colour; certainly, colourleſs Fining merits the Preference to all other as being more ſimple; but, as it is neceſſary ſometimes to humour childiſh Ignorance and Perverſeneſs, a ſmall Addition of Juice of Elder Berries will prove an excellent *Sweet Meat* for this Purpoſe. It ſhould be commixed with the Beer previous to the Addition of Iſinglaſs, and will, on Account of its natural Acidity, notably aſſiſt the Diviſion, and improve the fancied Richneſs of the Fining; but as a colouring Matter to heighten and improve the Colour of pale Beers, it ſeems to be very indifferently adapted; for as it is a crude fermentable Extract, it will diſpoſe Beer to *fret*, and provided the Flavour could be admitted inexceptionable, ſtill the Colour which it imparts muſt be allowed unnatural, and by no Means reſembling that obtained from Malt in Brewing, which it ought to imitate in ſuch a concentrated State, as to anſwer the Intention in a very ſmall Quantity. As we have aſſumed the Liberty to condemn a colorific Matter, which has long been univerſally approved of, perhaps it may be expected, that we point out a Succedaneum, which will anſwer all the Intentions of the former without its Inconveniencies; the Taſk appears not a little arduous, ſince we are debarred the Uſe of Sweets; but although many cogent Reaſons preſcribe Silence, hence, as to Compoſition, yet, as the Deſcription of the Properties, which a true colouring Matter for Beer ought to poſſeſs, may afford Hints to others intereſted in Purſuits of this Nature, we give them as follows: *Cheap, wholeſome, unfermentable nearly inodorous, unalterable by long Time, commiſcible with Fining, indiſcoverable* *by Taſte, and imparting no yellow Tinge to the Head, or Spume of Beer.* That ſuch a colorific Liquor can be prepared anſwerable hereto, which will communicate any Degree of Colour to Beer, and that of the moſt natural, durable, and beautiful Kind, we can warrant by Experience.

THERE is another concomitant Property attending foreign ordinary Book Iſinglaſs, which being inſufficiently remarked in its proper Place, is of too much Conſequence to be totally diſregarded; we mean that Species which is generally colligated in Rows with Needle and Packthread; each Piece conſiſting of ſeveral Membranes, with tranſverſe Fibres folded over each other; the outward Membrane of which appears whiter than the next incloſed, and the Innermoſt of a yellow brown Hue, decayed, and yielding an abominable fœtid Smell; the inodorous and whiteſt Pieces are therefore to be preferred to ſuch as are diſcoloured and infected with the hairy Teguments *(Exuviæ)* of Inſects, which afford ſtrong Suſpicions of a prior Putrefaction: If the yellow brown Matter be held near the Fire, it will be found replete with a ſtinking fat Oil, occaſioned through Ignorance or Uncleanneſs in the Manufacture; hence it is eaſy to conceive, that the whole muſt very Difficultly reſolve into Fining, and contaminate Beer from its putrid Quality; and it frequently happens that a thick oily Scum, of a diſagreeable Odour, ariſes to the Surface in the Butt; we muſt, however, in Juſtice acknowledge, that this Iſinglaſs can be perfectly diveſted of all its bad Properties, and actually ſo meliorated by Art, as to anſwer every deſirable Purpoſe of the Brewer, and prove in no reſpect inferior to the reputed beſt Sorts, except in Time of Diſſolution, which Property is likewiſe greatly improved by the Proceſs; we have been more particular in this Remark, on Account, that the Defects above-mentioned have been induſtriouſly reported as conſequential of uſing *Britiſh* Iſinglaſs; a Tale which has obtained more Credit, ſince it has been ſuggeſted, that the greateſt Conſumers of this medley Matter, are reputed the principal Encouragers of the *Britiſh* Manufacture; the Produce of which, on the contrary, is well known to be perfectly inodorous in its dry State; it may be neceſſary to add, that all Sorts of Iſinglaſs, more or leſs, yield a diſagreeable Smell as ſoon as the Diviſion of the Fibres begins to take Place, occaſioned by the [redacted] * Principle being thus oily ſet looſe, which before was impriſoned, in the membranous Parts, and of which *Britiſh* Iſinglaſs is not without its Share, as has been obſerved before; but if it be conſidered, that as nothing oily or fœtid is to be perceived upon it externally, being all freſh manufactured, and perfectly ſound, and that ſeldom more than one Ounce is proportioned to a Butt, it will readily occur, that the Quantity of the oily Principle, muſt be exceeding ſmall, and which, as it ſwims at the Top ſcarce deſerves a Remark; but the Caſe differs very eſſentially, where Iſinglaſs is known to be extremely old and fœtid, of which kind we have known large Quantities imported within two Years paſt, that have been many Years rejected as [redacted]leable and uſeleſs; and notwithſtanding of late, every foreign Scavenger in *Europe* has been employed to rake up the old refuſe Offal for the *Engliſh* Market, in a View to ſupercede our own Manufacture; yet there is the moſt ample Conviction, that our own Produce has actually reduced the Price of this faſhionable Rubbiſh, one hundred and fifty *per Cent.* within two Years paſt; and had it not been unaccountably circumſcribed, might have aboliſhed the latter entirely 'ere now; but where the Proſpect of future Advantage lays ſo diſtant, that every trivial Object muſt be preferred thro' the mean Oeconomy of ſaving a *Bagatelle*, Remonſtrance is in vain.

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* In order to ſeparate this oily Matter to Advantage, if *Britiſh* Iſinglaſs be firſt previouſly ſteeped in Water, acidulated with Oil of Vitriol to the Strength of common Vinegar, it will be found to expand and approach towards a Solution in twenty-four Hours; but before the latter actually takes Place, the Iſinglaſs ſhould be well ſtirred up, and the Water permitted to run off, and this is an excellent Method of preparing it to diſſolve in Beer afterwards, as it not only ſweetens it greatly, but facilitates the Diſſolution; Water in this Caſe may be twice the Quantity, or in Proportion of two Barrels to ten Pound of Iſinglaſs.

WE are not without Hopes, however, that the Materials of our own Colonies will ſhortly turn the Scale in our Favour, and remove this Oppreſſion, by effecting that natural Prohibition of this foreign Traffic inadmiſſible hitherto thro' Partiality, although ſo evidently deſtructive to the commercial Intereſt of this Kingdom, and Diſſipation of its Wealth; eſpecially if it ſhould once ſtrike the Directors of legiſlative Power, that by a well regulated Impoſt upon foreign Iſinglaſs, the Revenue of the Crown would not only be conſiderably augmented, but that at leaſt an annual Remittance of 40,000 *l.* in Specie, into a Country where the Ballance of Trade is well known to be 80 *per Cent.* againſt us, might be ſaved at Home, which, in ſome Meaſure, has been already effected; ſince, as the Conſumption in the Brewery is calculated at twenty-five Tons annually, it muſt be allowed, that we have ſaved, from our Commencement in the Buſineſs, at leaſt one in four; a Confeſſion which we hope will add ſome Energy to our Cauſe, for notwithſtanding the trivial Demand conſtrains us to exclaim, yet we ſhould be culpable of the higheſt Ingratitude, to permit the Conſequences of any Succeſs, to obliterate the many Obligations conferred by thoſe Perſonages, who firſt patronized our Invention in its Infancy, and who at the ſame Time did themſelves exemplary Honour, thro' a patriotic Diſpoſition and rare Attachment to promote the Arts and Manufactures of their own Country.

WE ſhall now conclude this Eſſay, with a general Scholium or Reduction of the principal Contents into one View, for the more eaſy Reference to particular *Deſiderata*.

1. WE find that Iſinglaſs is the Baſis of Fining for Beers, that the *Muſcovites* were the firſt Contrivers of the Manufacture, that all Authors who have hitherto treated upon it, have delivered us various illuſive and hypothetical Proceſſes for its Preparation; that the genuine Method of manufacturing all Sorts of Iſinglaſs was unknown in theſe Kingdoms, till we diſcovered the ſame by a true Analyſis of its integrant Parts, and a genuine Syntheſis or Recompoſition of the ſame, ſo as to reconſtitute its artificial Form.

2. THAT all Sorts of Iſinglaſs proper for Fining are compoſed of *Fibrillæ*, or ſlender Fibres viſible to the naked Eye, on Dilaceration, and which are infinitely diviſible by cold Maceration in ſubacid Liquors, as acid Wines, eager Beers, *&c.*

3. THAT the Virtue of Fining depends principally upon the minute Diviſion of theſe Fibres; that the longer it is preſerved in any cool Place in covered Veſſels, the more perfect will be ſuch Diviſion; on the contrary, that a very gentle Heat, greatly leſs than that of the Air in Summer, will perfectly diſſolve the minute Fibres, and convert the Fining into a tenacious Fluid, or thin Jelly, in which State it will thicken, or render Beer foul and *ſtubborn*, inſtead of clarifying it; conſequently that the cooleſt Places are the beſt Repoſitories for Fining, which ſhould be conveyed from thence, and commixed with the Beer to be fined as quick as poſſible in warm Weather.

4. THAT long and ſhort Staple Iſinglaſs are compoſed of ſingle Membranes, whoſe Fibres run parallel to each other, and are hence eaſily diviſible; that the Book Sorts conſiſt of duplicate Membranes, which cut each other tranſverſely, which complicated Texture prevents their Reſolution in Beer ſo readily as the more ſimple Kind; yet it is evident, by allowing a ſufficient Time to

obtain a perfect Diviſion, that both Sorts, taken in equal Weights, will produce a ſimilar Quantity of Fining of equal Efficacy, to all Intents and Purpoſes, in the due clarifying of Beers.

5. THAT this Doctrine ſeems fully confirmed by the Experiment, that equal Quantities of all the Sorts of Iſinglaſs will yield exactly the ſame Quantities of the ſtrongeſt Glues, under the ſame Circumſtances, by Decoction and Inſpiſſation after the uſual manner, as containing ſimilar Proportions of ſoluble Matter, although under different Surfaces; that the *Ruſſians* prepare all their Glue from Iſinglaſs, which will likewiſe yield the ſtrongeſt Size for the Uſe of the Gilder, Paper Stainer, Buckram Stiffener, *&c.* That the fine pellucid Iſinglaſs is chiefly conſumed by the Manufacturers of mock Pearl Beads, Linens, Silks, Gauſes, *&c.* whereby the Conſumption of Gums and Starch have been juſtly ſuperſeded, on Account of their diſpoſing the Fabrics to rot, crack, and mildew.

6. THAT Staple Iſinglaſs diſſolves gradually in Beer from the Circumference towards the Center, and occupies a large Space, and that the Book Sorts, eſpecially *Britiſh* Iſinglaſs, after ſwelling into a ſurpriſing Bulk, reſolves into a pulpous Magma altogether, and takes up a much leſs Space, an Account of its ſuperior ſpecific Gravity, and hence falls cloſer to the Bottom of the Butt.

7. THAT Fining prepared with *Britiſh* Iſinglaſs is naturally prone to liquify with leſs Heat in Summer than foreign, which may be greatly prevented by Admixture with Whites of Eggs: That equal Parts of both Sorts of Iſinglaſs, converted together into Fining at any Seaſon of the Year, act conjointly more powerfully than ſingly; that very ſtale Malt Liquor is the beſt Menſtruum for Fining; that the Acidity not only divides the fiſhy Fibres moſt effectually, but prevents Putrefaction; that ſtale ſmall Beer rather rots than divides Iſinglaſs like the former, which is of the worſt Conſequence to the Victualler, in contaminating the whole Butt; that the utmoſt Diviſion of Fining

with the Whiſk, is abſolutely neceſſary immediately before Admixture with the Subject to be fined; and that mineral Acids, in too great Proportion, rather ſpoil than meliorate the Activity of Fining, on Account of their too corroſive Principles, which Miſchief may be avoided by ſubſtituting vegetable Acids to improve the requiſite Acidity of Beers too mild, without Danger of increaſing the predominating Staleneſs of forward Beers, as Iſinglaſs remarkably deſtroys Acidity, in its Reſolution into Fining.

8. THAT a Drop of Fining let fall into a Glaſs of fair Water preſents its Fibres to the Eye, from whence it appears, that Fining is only an imperfect Jelly or peculiar Magma, whoſe clarifying Principles are conſequential of a certain but not perfect Reſolution of the Parts of Iſinglaſs; that the finer perfect Jellies or Glutens, as thoſe of Hartſhorn, Calves Foot, Leather, *&c.* are found to produce nearly the reverſe Effects, and that all Gums ſoluble in aqueous Fluids poſſeſs the ſame Properties.

9. THAT Stubbornneſs in Beer is ſometimes occaſioned by the Addition of imperfect Fining, eſpecially in warm Weather; but that it more frequently ariſes from Miſmanagement in Brewing, and ſecondary Cauſes in the Cellar; and that the Hydroſtatic Balance is the beſt Inſtrument to aſcertain the different Degrees of Stubbornneſs with Accuracy and Preciſion.

10. THAT Iſinglaſs is greatly preferable to vegetable Matters, admitting the latter to be poſſeſſed of the ſame clarifying Principles; that the former being an animal Subſtance, is ſuſceptible of no Fermentation or fretting Diſpoſition, but lays quiet and inactive in this reſpect in all vinous Liquors, while the latter are very prone to ferment, and frequently reproduce the ſame Foulneſs which the other cures; that pure Iſinglaſs is perfectly ſweet and inodorous, and that the browneſt Sorts, if ſound, communicate no Tinge to Liquors in the Form of Fining, not even to fair Water.

11. THAT Authors are miſtaken in the Cauſes of Opacity, or Cloudineſs of Beer; that the Defect is abſolutely irremediable by Iſinglaſs, which notwithſtanding can be reſtored to perfect Tranſparency by Art, but much eaſier prevented than remedied; why Ales fall ſpontaneouſly bright, and Porter not; and what it is that conſtitutes Yeaſt a general Ferment, deſerving Enquiry; that a true Theory is indiſpenſibly neceſſary to the perfecting of all Arts, and particularly that of Brewing, which is an entire *Chemical Proceſs*, which may be conducted by Rule, and not left to accidental Trial or caſual Experiment; that a due Attention to Phœnomena, ariſing in Practice, will lead to a genuine Theory and Speculation, and Theory back again to a more extenſive and certain Practice; that by certain appropriated Treatments, according to analytical Theory of the conſtituent Principles of Malt and Hops, and peculiar Management in Fermentation, a much larger Yield of equally good Beer can be obtained from a given Quantity of Materials, than in ordinary Practice, and that Barley, by a different Procedure in the Art of Malting, will afford a much greater

Quantity of genuine fermentable Matter, than what is procurable by the preſent Practice; that the preſent State of Malting and Brewing would receive great Improvement, if due Encouragement was given to proſecute the Diſcovery of certain Deſiderata; that the wooden Apparatus of a Brew-houſe may be conſtructed upon better Principles with regard to general Advantage in Buſineſs, as well as Preſervation from Decay; that it appears practicable to convert Firr into a very durable State, ſo as to prove an excellent Succedaneum to Oak, for the Conſtruction of Caſks; and that new Butts of Oak can be cheaply prepared by Art to reſiſt the Rot occaſioned by damp Walls, *&c.*

12. THAT the Art of clarifying Liquors with Iſinglaſs was firſt diſcovered by the Chemiſt; that the intrinſic Value of different Species of Iſinglaſs ſeems hitherto imaginary and inadjuſted, except in Price; that all foreign Sorts are producible from one Species of Fiſh, notwithſtanding that various Kinds will yield Iſinglaſs; that the beating and tearing it into Shreds is unneceſſary for Fining.

13. THAT the Value of Fining, and its Modes of Operation upon Fluids, together with the different Degrees of Fœculency, *&c.* in Beer are demonſtrated by our Proof-Glaſs; that the Action in ſmall Quantity will determine the Appropriation of the neceſſary Quantity for a Butt, which will be influenced in the ſame Manner, *cæteris paribus*, that Fining with the Fœculæ of Beer forms a Coagulum which ſubſides or emerges, according to the fretting State and ſpecific Gravity of Beer; conſequently, that whatever tends to coagulate the glutinous Matter of Fining, when the Fibres have been deſtroyed by Heat, will greatly increaſe the Activity of Fining preferably to the Addition of *vitriolic* Acid, which frequently increaſes Stubborneſs; that the fœculent Curd can be promoted by the Intermedium of a ſmall Quantity of a certain ſaline diſſoluble Powder, and that ponderous Matters are abſurdly applied to carry down Fining in the Caſe of ſtubborn Beers.

14. THAT the Proof-Glaſs is equally uſeful to the Victualler as Cooper, and that the Brewer may apply it to intereſting Purpoſes; that the artificial Colour of Fining is unneceſſary, except in Beers too pale; that Juice of Elder Berries promotes the Reſolution of Fining, but communicates an unnatural Colour to Beer; and that a moſt beautiful unexceptionable Tinge for this Purpoſe is producible by Art.

15. THAT foreign ordinary Book Iſinglaſs is generally decayed internally, and infected with a brown oily putrid Matter, which is inconvertible into Fining, and contaminates Beer with the ſame offenſive *Fœtor*; that when it is diveſted of this Matter by Art, it readily diſſolves into Fining, equally uſeful and extenſive in the ſame Proportions as the fancied beſt Sorts; that *America* yields Materials enough for this Sort of Iſinglaſs; that the due Support of the *Britiſh* Manufacture at Home, is the moſt probable Means to reduce the exorbitant Price of foreign Iſinglaſs; that it would excite Induſtry, promote the Fiſheries, Trade and Navigation, amongſt

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amongſt *Britiſh* Subjects, increaſe the national Revenue, and avert a moſt reproachful Indignity committed upon ourſelves, by aboliſhing a ſhameful Remittance to Foreigners for an Article producible in our own Country.

FINIS.